

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 February 2005 (24.02.2005)

PCT

(10) International Publication Number
WO 2005/017813 A2

(51) International Patent Classification⁷: **G06K 9/00**

(21) International Application Number:
PCT/EP2004/009221

(22) International Filing Date: 17 August 2004 (17.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
03090256.3 19 August 2003 (19.08.2003) EP
04090263.7 29 June 2004 (29.06.2004) EP

(71) Applicant (for all designated States except US): **FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V. [DE/DE]**; Hansastrasse 27 c, 80686 München (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MÜLLER, Klaus-Robert [DE/DE]**; Fregestrasse 7 A, 12159 Berlin

(DE). **LASKOV, Pavel [RU/DE]**; Flemmingstrasse 10, 12555 Berlin (DE). **TAX, David [NL/DE]**; Arndtstrasse 28, 12489 Berlin (DE). **SCHÄFER, Christin [DE/DE]**; Bouchestrasse 22, 12435 Berlin (DE).

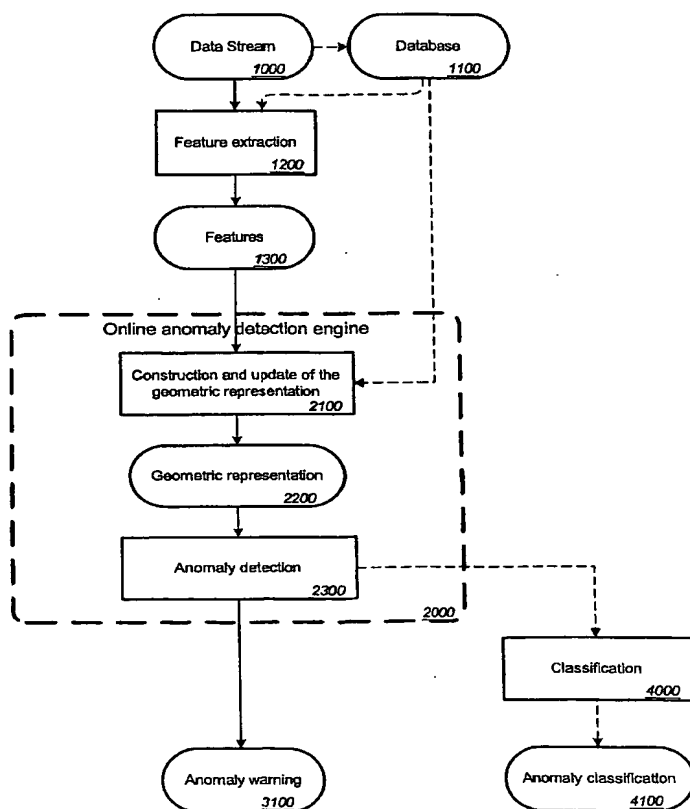
(74) Agent: **GROSS, Felix**; Maikowski & Ninnemann, Postfach 15 09 20, 10671 Berlin (DE).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR AUTOMATIC ONLINE DETECTION AND CLASSIFICATION OF ANOMALOUS OBJECTS IN A DATA STREAM



(57) Abstract: The invention is concerned with a method for automatic online detection and classification of anomalous objects in a data stream, especially comprising datasets and / or signals, characterized in that a) the detection of at least one incoming data stream (1000) containing normal and anomalous objects, b) automatic construction (2100) of a geometric representation of normality (2200) the incoming objects of the data stream (1000) at a time t_1 subject to at least one predefined optimality condition, especially the construction of a hypersurface enclosing a finite number of normal objects, c) online adaptation of the geometric representation of normality (2200) in respect to received at least one received object at a time $t_2 \geq t_1$, the adaptation being subject to at least one predefined optimality condition, d) online determination of a normality classification (2300) for received objects at t_2 in respect to the geometric representation of normality (2200), e) automatic classification of normal objects and anomalous objects based on the generated normality classification (2300) and generating a data set describing the anomalous data for further processing, especially a visual representation.



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.